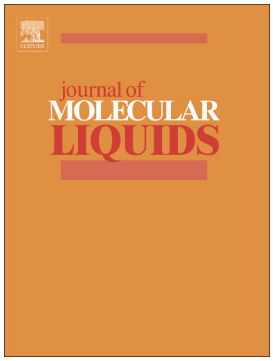


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# Numerical Study of Nanofluids Natural Convection in a Rectangular Cavity Including Heated Fins

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## Abstract

In this paper, natural convection heat transfer of nanofluids in a rectangular cavity investigated while two heated fins are located in the cavity. The governing equations are solved by finite element method (FEM) using FlexPDE commercial package software. Water is considered as the base fluid and two nanoparticles ($TiO_2$ and $Al_2O_3$) are added as the second phase or additives to base fluid. The problem is solved for different nanoparticles volume fraction and fin height to study the effect of these parameters on the local and average Nusselt numbers. Results show that maximum point of local Nusselts numbers (which occurs along the fins locations) for the $TiO_2$ is larger than $Al_2O_3$ except when the $\varphi$=0.09. Also, $TiO_2$ leads to more average Nusselt number as well as larger fins height in most cases.

***Keywords:*** Finned Cavity; Nanofluid; FlexPDE; Nusselt number; FEM

## 1. Introduction

Extended surfaces or fins are devices to increase heat transfer in different industrial applications by increasing the surface in convection heat transfer. In many mechanical engineering applications, chemical engineering, energy, heat recoveries, surface studies, etc. fins have large applications [1], so it motivated the researchers to improve their accuracy by different ways such as

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